

HYD 347

Files

HYD-347

MASTER
FILE COPY

BUREAU OF RECLAMATION
HYDRAULIC LABORATORY
NOT TO BE REMOVED FROM FILES

BLACK CANYON
REPORT

C O P Y L K R

Denver, Colorado
February 26, 1952

Memorandum

To: Chief, Dams Branch

From: Chief, Engineering Laboratories Branch

Subject: Model demonstration of bucket proposed for rehabilitation of Black Canyon Dam Spillway—Boise Project, Idaho

1. On January 14 Mr. Hammond requested that a model be constructed to observe the operation of the proposed bucket for the spillway for Black Canyon Dam. The bucket is shown in Figure 1. A sectional model was constructed on a 1:23 scale, adapting the bucket to an already existing overfall dam section in the 2-foot-wide laboratory flume. The model thus represented a section of the prototype spillway 46 feet wide or approximately two-thirds of a bay.

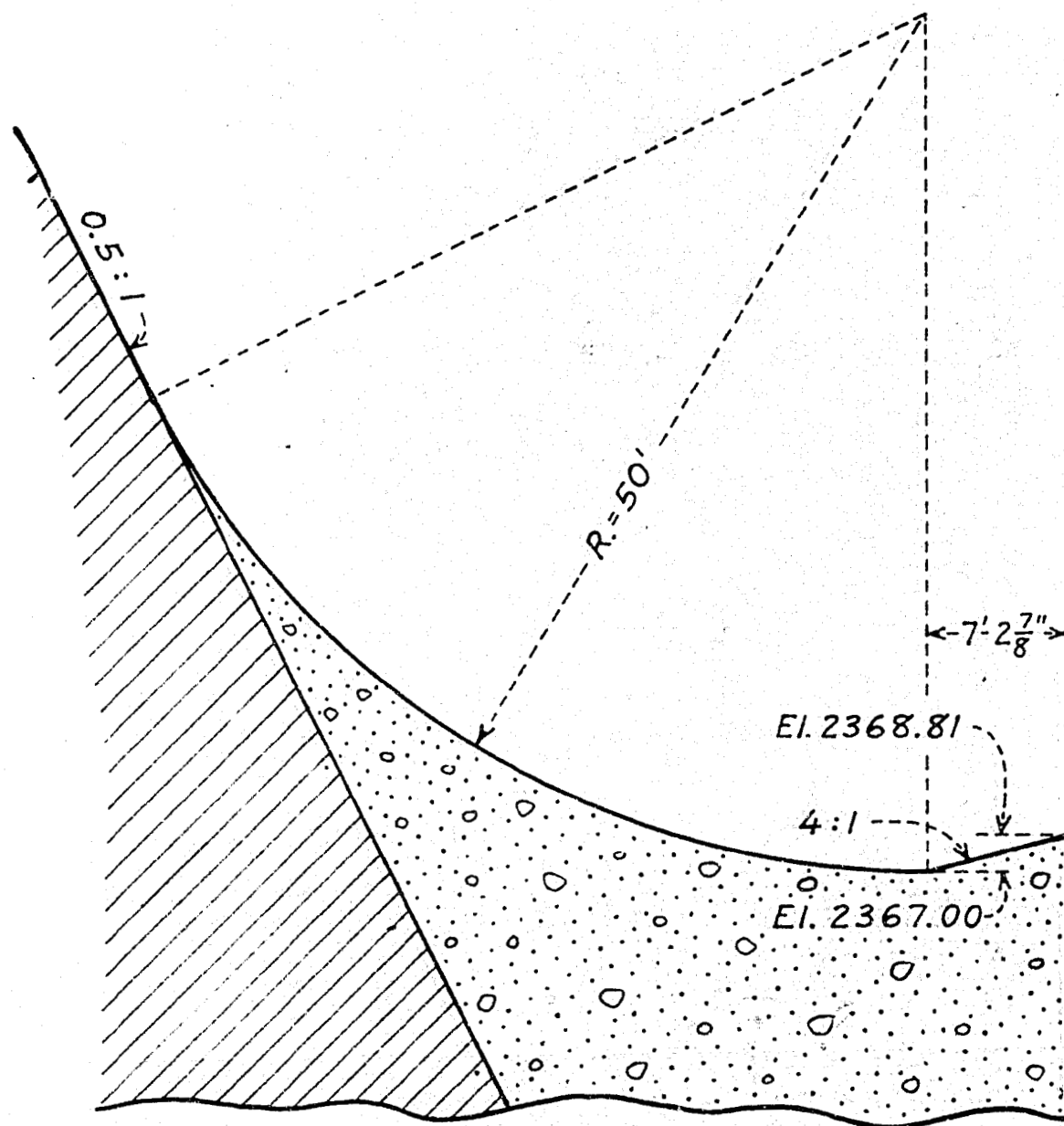
2. Operation of the model spillway was observed by Messrs. Nalder, Hammond, Puls, Schultz, Winter, and Krueger. All expressed the opinion that the operation was satisfactory over the entire range of discharges and tail-water depths. Photographs of the bucket operating at discharges of 9,000, 15,000, 18,000, 24,600, 27,000, 29,300, 33,100, and 36,000 second feet are included as Figures 2 and 3. The estimated tail-water curve used in connection with these tests is included in Figure 4.

3. Sweep out tests were made as a matter of record to determine the tail-water elevation at which roller action in the bucket ceased, or the point at which the jet assumed a free trajectory. This was done for several discharges and the results are also plotted on Figure 4.

4. Some concern was expressed regarding the boil, produced by the roller, as the powerhouse is located in line with the roller. Measurements were taken to define the position and size of the boil for several discharges. These measurements are shown in tabular form on Figure 5.

5. In conclusion, the proposed bucket for the rehabilitation of Black Canyon Dam is quite satisfactory for this installation, where a large hole exists downstream. It should be pointed out, however, that the operation of this type of bucket can be quite unstable when the bucket is set at or below riverbed level.

FIGURE 1



PROPOSED BUCKET
FOR REHABILITATION OF SPILLWAY
BLACK CANYON DAM



9,000 cfs



15,000 cfs

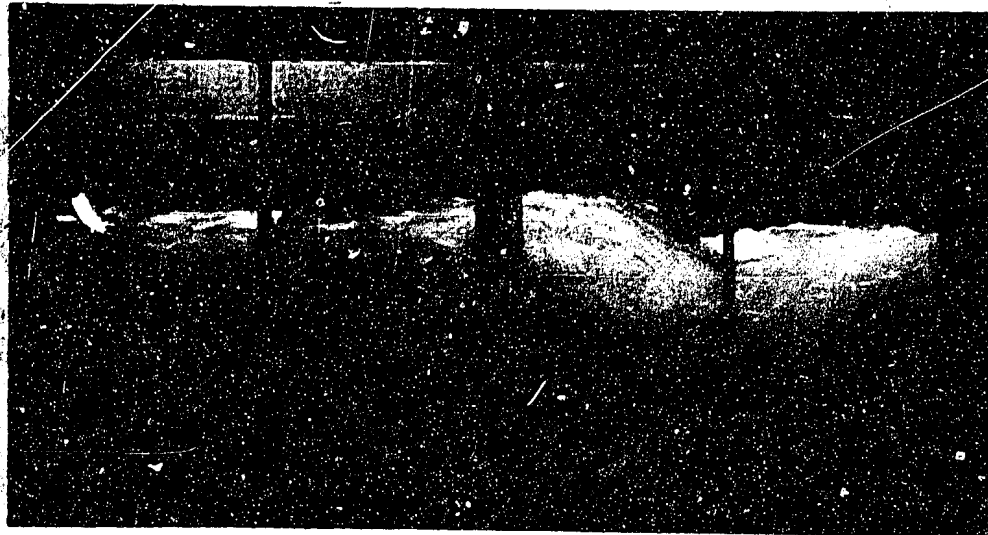


18,000 cfs

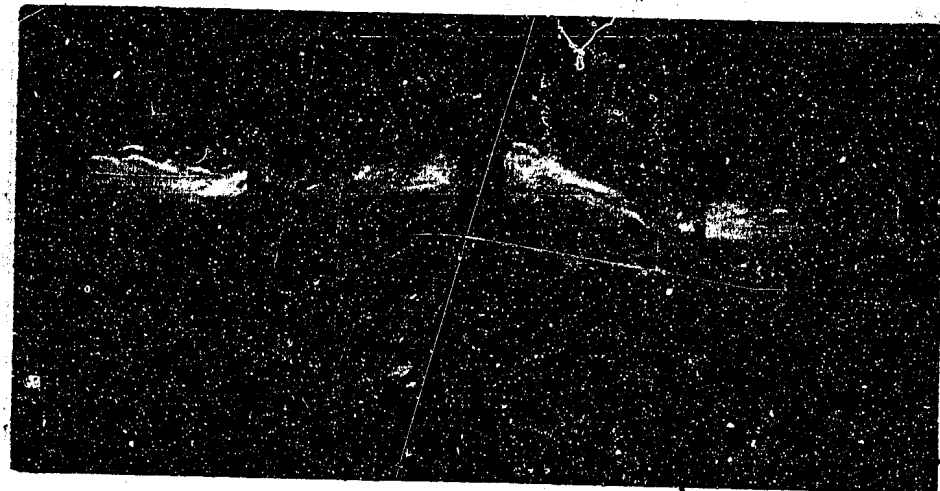


24,600 cfs

Spillway Bucket Operation
Black Canyon Dam



27,000 cfs



29,300 cfs

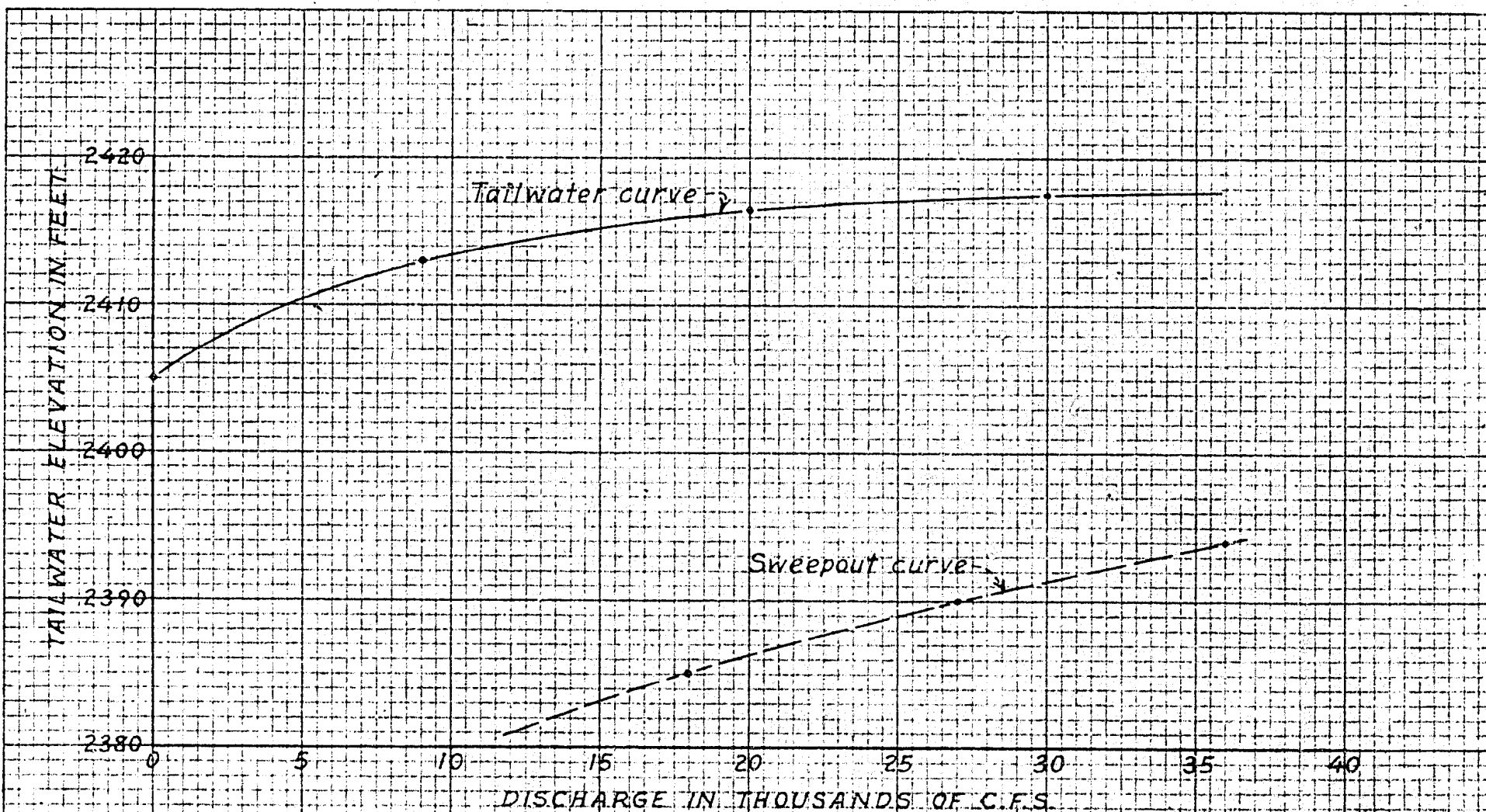


33,100 cfs

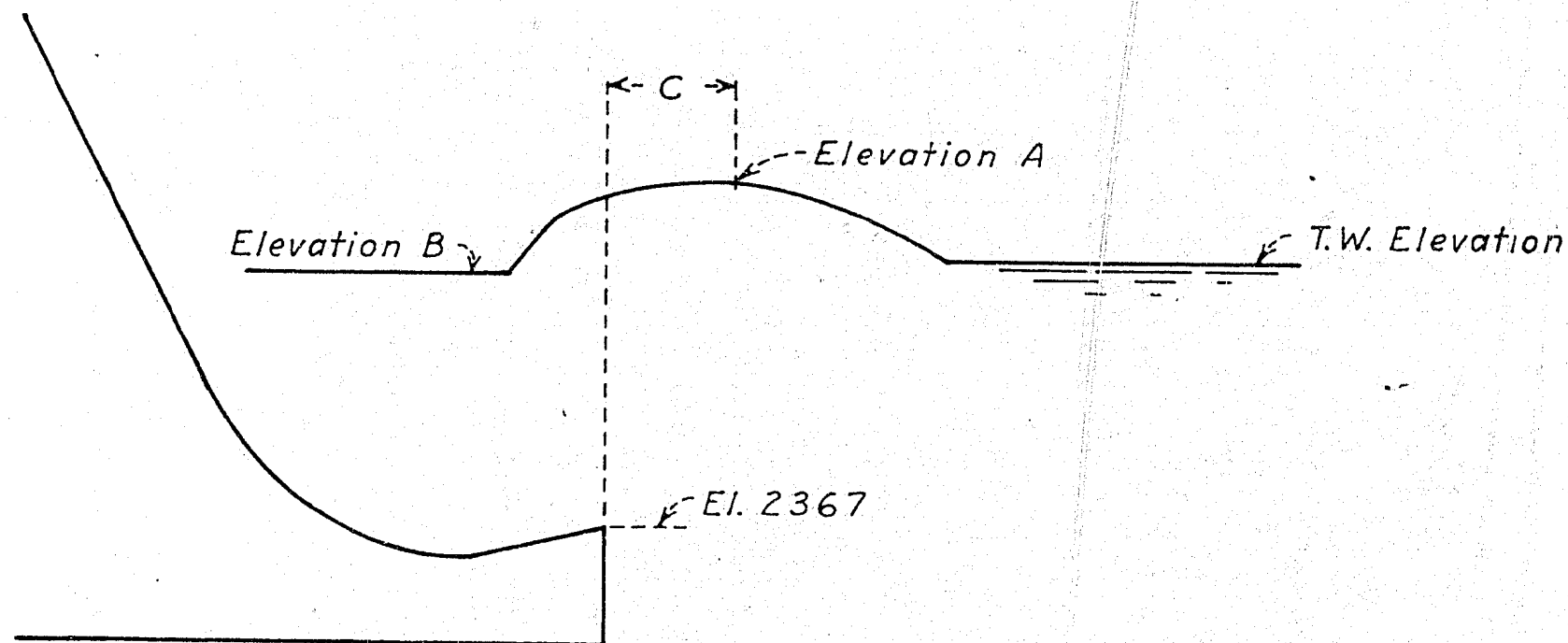


36,000 cfs

Spillway Bucket Operation
Black Canyon Dam



TAILWATER AND SWEEPOUT CURVES
BLACK CANYON DAM



Q IN C.F.S.	T.W. ELEV.	DIST. C FT.	ELEV. A	ELEV. B
36,000	2418.0	44.0	2427.3	2412
33,000	2417.8	43.1	2426.4	2412
27,000	2417.4	39.3	2424.4	2412
18,000	2416.0	32.6	2420.6	2412
9,000	2413.0	21.1	2414.9	2412

POSITION AND HEIGHT OF ROLLER
BLACK CANYON DAM